female pronucleus it is equal in size to the latter. In the case when the impregnation is deferred for four hours, the male pronucleus never becomes so large as the female pronucleus. With reference to the effect of the time at which impregnation takes place, Asterias would seem to serve as a type" (Balfour, Comp. Embryol., Vol. 1, p. 68).

Thus when impregnation takes place at a very early period, since the ovum in its own independent course of development has not yet reached the segmenting stage, the immediate effect of the union of the female and male elements is a modification of the male element by which it is to some extent assimilated in character to the female element. In consequence there is established in the fertilized ovum at the outset a relative preponderance of the factor of cell-growth, in its developmental tendencies; and this, by the theory, determines to the production of the female sex. But where impregnation takes place at a late period, when the ovum in its development has reached the segmenting stage, its modifying action on the male element before the union is completed is less; and in consequence there is established in the fertilized ovum at the outset a preponderance of the factor of cell-division, which the male element represents; and this, by the theory, determines to the production of the male sex.

It appears, therefore, that the theory of sex and sexual genesis that is here proposed, affords a reasonable explanation of the observed effects of the time of impregnation in determining sex. And so far as all the known causes on which the determination of sex depends are incapable of being equally well explained on any other theory, they may be taken as giving support to this theory.

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THE CONDYLARTHRA.

BY E. D. COPE.

IN a paper on the homologies and origin of the molar teeth of the Mammalia Educabilia, published in March, 1874,[1] I ven-

[1] Journal of the Academy of Natural Sciences of Philadelphia. The language which I used is as follows: "I trust that I have made it sufficiently obvious that the primitive genera of this division of mammals [Mammalia Educabilia = Unguiculata and Ungulata sensu latâ] must have been bunodonts with pentadactyl plantigrade feet."

The nearest approaches to a similar anticipation on the part of other naturalists which I have been able to find, refer to the number of toes only, and are of restricted

tured the generalization that the primitive types of the Ungulata would be discovered to be characterized by the possession of five-toed plantigrade feet, and tubercular teeth. No Perissodactyle or Artiodactyle mammal was known at that time to possess such feet, nor was any Perissodactyle known to possess tubercular teeth. Shortly after advancing the above hypothesis, I discovered the foot structure of Coryphodon, which is five-toed and plantigrade, but the teeth are not of the tubercular type. For this and allied genera I defined a new order, the Amblypoda.

In 1873[1] I described, from teeth alone, a genus under the name of Phenacodus, and although a good many specimens of the dentition came into my possession since that date, I was long unable to assign the genus its true position in the mammalian class. The teeth resemble those of suilline ungulates, but I had never had sufficient evidence to permit its reference to that group. Allied genera, subsequently discovered by me, were stated to have a hog-like dentition, but their position could not be determined until the structure of the feet should be ascertained.[2]

In his explorations in the Wasatch Eocene of Wyoming, in 1880, Mr. J. L. Wortman was fortunate enough to discover nearly entire skeletons of *Phenacodus primævus* and *P. vortmani*, which present all the characters essential to a full determination of the place of Phenacodus in the system. The result is, that this genus must be placed in a special group of an order which in-

application. Thus Kowalevsky remarks (Monographie der Gattung Anthracotherium, Palæontographica, XXII, p. 1452): "So we can assume a tetradactyle foot as our point of departure, although it cannot have the least effect on the result in case the original ungulate foot should have been pentadactyle; if I have set out with a tetradactyle foot it is simply because I wish to adhere, so far as possible, to facts." This was written August, 1873, but how soon thereafter it was printed I do not know. I did not meet with it until at least a year after the publication of my paper of March, 1874, cited. Secondly, Marsh, in writing on the genealogy of the horses (*American Journal of Science and Arts*, March, 1874, p. 257), says: "A still older ancestor [of the horse], possibly in the Cretaceous, doubtless had five toes on each foot, the typical number in mammals." My paper was published during the same month as the above, but I communicated the substance of the generalization in question to the Philadelphia Academy the day it was read, Nov. 18th, 1873, which was published in the Proceedings of the Society, Jan. 13, 1874 (see p. ii).

[1] Palæontological Bulletin No. 17, Oct., 1873, p. 3; also Report G. M. Wheeler, U. S. Engineers Expl. W. 100 mer., IV, p. 174, 1877. In the figure of the superior molar teeth in this work, the last molar is misplaced.

[2] Proceeds. Amer. Philosoph. Society, 1881, p. 495.

cludes also the Hyracoidea.[1] This order realizes fully the anticipation which I expressed in 1874, for the greater number of its species are pentadactyl and plantigrade, both anteriorly and posteriorly, and have tubercular or bunodont dentition. The order to which I have referred Phenacodus, the Taxeopoda, has been already defined in these pages.[2] It includes those curious mammals the *Hyracoidea* or conies, and is divisible into two sub-orders by the following characters:

A post-glenoid process; no fibular facet of calcaneum, but an interlocking articulation between fibula and astragalus; ungual phalanges truncate.... *Hyracoidea.*

A post-glenoid process; no fibular facets on either calcaneum or astragalus; a third trochanter of the femur; ungual phalanges acuminate..... *Condylarthra.*

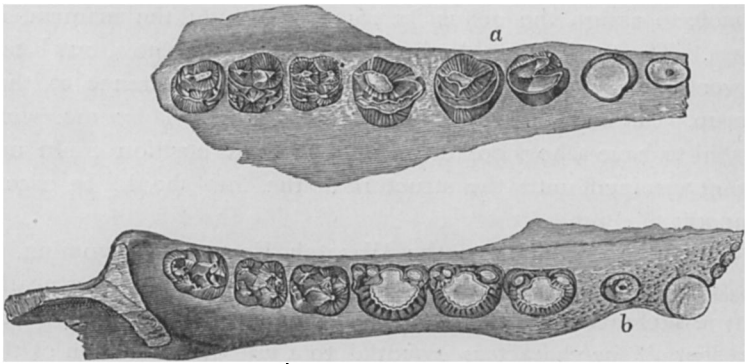

FIG. 1.—Dentition of *Periptychus rhabdodon* Cope, two-thirds natural size. Fig. *a*, superior molars from below; *b*, inferior molars from above. From the Puerco beds of New Mexico. Original. From Vol. III, Report U. S. Geol. Survey Territories.

The astragalus in the sub-order Condylarthra is absolutely undistinguishable from that of the flesh-eating groups Creodonta and Carnivora. The humerus also presents a character of the unguiculate orders, in possessing an epicondylar foramen, which is elsewhere unknown among ungulates. The humeral condyles have the generalized character of the same type as the Amblypoda, and of the lower Perissodactyla, in lacking an intertrochlear crest.[3] The Condylarthra may then be further defined as follows:[4] *Astragalus with one uniformly convex distal articular face; humerus with epicondylar foramen.* This sub-order has as yet been

[1] AMERICAN NATURALIST, June, 1882 (May 17).

[2] AMERICAN NATURALIST, 1882 (May 20th) p. 523. Proceeds. American Philosoph. Society, 1882, p. 444.

[3] AMERICAN NATURALIST, April, 1832, p. 334.

[4] AMERICAN NATURALIST, 1881, p. 1017, Nov. 29.

only found in the lowest horizons of the Eocene period, the Puerco and Wasatch, and only on the North American continent. Appropriately to this position in time, its structure indicates that it is the most primitive type of the Ungulata. A number of genera and species belong to it, and these fall into three families, which are defined as below. They conform to the definitions of the order in possessing the full mammalian number of teeth, and a third trochanter of the femur. The approximation to the Hyracoidea is greater than that of any other group of the Ungulata. That order agrees with the Condylarthra in the simple articular extremity of the astragalus, which is, however, less convex; but it has a very peculiar articulation with the anterior face of the extremity of the fibula, seen in no other group of ungulates. In the manus of the Hyracoidea the lunar bone agrees with the Condylarthra in not being divided below into two facets, as in most other ungulates, but it is peculiar in extending to the trapezoides (the intercalare), and to the unciform. In this point the Hyracoidea come nearer to the Amblypoda. In Hyrax there is also no epicondylar foramen. The three families of Condylarthra are defined as follows:

Dentition bunodont; toes 5–5; astragalus without trochlea; neck very short; premolars very simple above and below.....*Periptychidæ.*

Dentition bunodont; toes 5–5; astragalus with trochlea; neck longer; premolar teeth different from the molars above and below.....*Phenacodontidæ.*

Dentition lophodont, with crescents and deep valleys; premolars partly like molars below; neck longer?.....*Meniscotheriidæ.*

The bunodont dentition, with very simple premolars, flat astragalus and five toes on all the feet, give the Periptychidæ the lowest place in the sub-order and order, as the most generalized type known. The Meniscotheriidæ have a quite specialized dentition, and until I learned its Condylarthrous character, I was at a loss to account for the presence of such perfection in so old a type. The number of the toes is yet unknown. The family appears to have had no descendants, and is a good illustration of Dr. Kowalevsky's views as to the persistence of the "adaptive" over the "non-adaptive" types of articulation. Kowalevsky observed that the types of Ungulata, which have the carpo-metacarpal and tarso-metatarsal articulations simple and not alternating, have become extinct. In those which persisted, the metapodials articulate with two bones of the carpal or tarsal series. I have discovered that the same rule has generally applied in the ungulates

to the middle carpal and tarsal articulations. The orders with the double articulation continued, while the Condylarthra, with the single articulation, have disappeared, leaving only modified descendants. The Proboscidea, which have the same simple distal articulation of the astragalus, still remain, however, to show an exception to the generalization. They have, however, an alternation in the second series of the posterior foot not present in the Taxeopoda. The relations of the genera of these three families are as follows:

PERIPTYCHIDÆ.

In Periptychus only are the posterior feet known. The carpus is yet unknown. The successional generic modifications are seen in

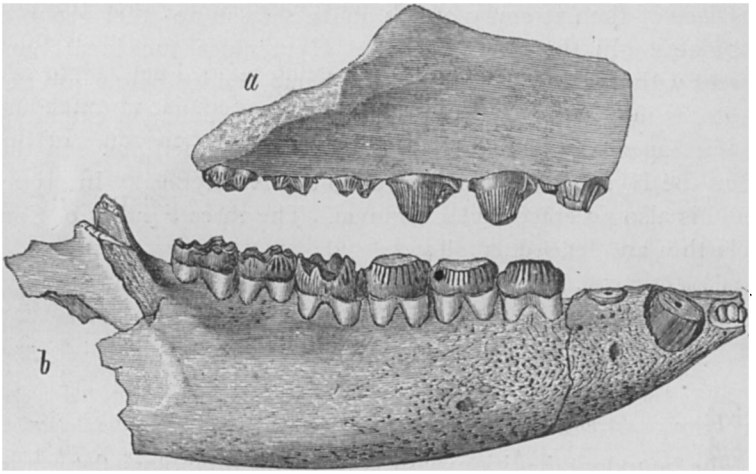

FIG. 2.—*Periptychus rhabdodon* Cope, jaws represented in fig. 1 seen in profile; two-thirds natural size. From the Puerco beds. Original.

the addition of cusps to the inner sides of the premolars of both jaws, and to the true molars of the upper jaws. In Ectoconus we have the largest number of dental cusps and lobes, and in Periptychus the next. In Anisonchus the inferior premolars lose their inner ledges, and the true molars their anterior internal lobes. The molars are still further reduced in Hemithlæus, and the premolars in Haploconus.

The characters of the genera are the following:

I. Three premolars.

Fourth superior premolar like molars; inferior premolars without internal ledge, *Hexodon.*

II. Superior molars with intermediate tubercles, and tubercles anterior and posterior to the internal cusp; four premolars.

Superior molars with an external cingular cusp; inferior premolars without internal ledge ..... *Ectoconus.*

No supplementary external cusps, inferior premolars with internal ledges. *Periptychus.*

III. Intermediate tubercles wanting; four inferior premolars, without internal lobes.

Superior molars with posterior internal cusp only, besides internal V; last two superior premolars with internal lobes ..... *Anisonchus.*

Superior molars with internal V only, no other internal lobes; last two superior premolars with internal cusps..... *Hemithlæus.*

Superior molars with posterior internal cusp only, besides apex of V; fourth superior premolar only with internal lobe..... ...*Haploconus.*

IV. Superior molars unknown; inferior premolar No. IV ? with two opposed crescents and a heel.

Inferior molars with one or two pairs of opposed crescents..... *Zetodon.*

All the known species of the Periptychidæ are from the beds of the Puerco Eocene.

From the preceding table it is obvious that the species of this

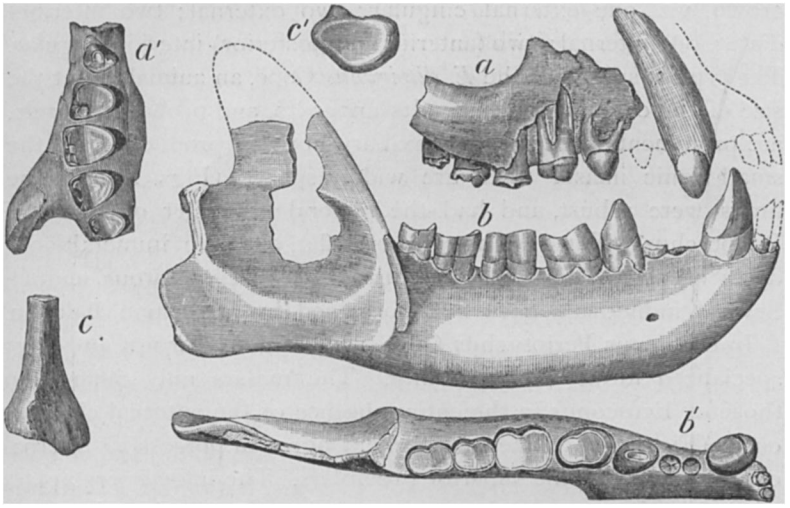

FIG. 3.—*Hexodon molestus* Cope, two-thirds natural size, from the Puerco beds of New Mexico. Fig. *a*, right maxillary bone, external view; *a'*, do. from below. Fig. *b*, right ramus mandibuli, external view; *b'*, do. from above. Fig. *c*, distal end of ? radius; *c'*, do. distal view. Original, from Vol. III, Report U. S. Geol. Survey Terrs., F. V. Hayden in charge.

family present considerable diversity in the degree of complication of their molar teeth. In all of them the premolars are more or less simple, and in Hexodon they are but three in number, while in the other genera there are four.

In Hexodon Cope the type is most developed in the direction of the dental prehension. With the shortening of the jaws comes

the loss of a premolar. The only species, *Hexodon molestus*, is known from the superior and inferior dentitions of a single individual. It differs from the *E. di[illegible]igonus* in the short, rounded incisive region and closely-placed incisor teeth, the small posterior superior molar, and the more robust and more vertical canine teeth (Fig. 5). It is about the size of the red fox, but much more robust. It is one of the few species of the family which is armed with large canine teeth, and evidently stood preëminent in its powers of offence and defence. In the typical specimen the teeth are all worn by the mastication of hard or tough substances, so that the structure of the crowns of the true molars is not entirely known.[1]

In Ectoconus Cope, we have the most complex structure of the molars in the family, or that the tritubercular type of superior molar is known to present. There are eight cusps on each crown, viz., one external cingular; two external; two intermediate; one internal; two (anterior and posterior) interior cingular. The typical species is the *E. ditrigonus* Cope, an animal about the size of the collared peccary. Its upper lip, and probably muzzle, are prominent, since the premaxillary bone is produced, and the small conic incisor teeth are widely spaced (Figs. 4–5). The limbs were robust, and had the general character of those of Periptychus. Thus the astragalus is flat, and the humeral condyles are wide, and resemble those of a carnivorous animal. Several individuals have been obtained by Mr. David Baldwin.

In the genus Periptychus Cope, we have the largest and most specialized forms of the family. The molars only differ from those of Ectoconus in the entire absence of the external cingular cusps (Figs. 1–2). The two genera agree in possessing internal cingular lobes of the superior premolars. The inferior premolars of Periptychus are a little more complex than in the other genera. The canine and incisor teeth are relatively small. What further characterizes the species of this genus is the extraordinary sculpture of the teeth of the entire molar series. This consists of strong grooves separated by convex ribs, which extend from the base towards and to the apex of the crown, the number be-

[1] This species is represented by a specimen which is referred by me to the *Cononyctes comma*, in the Vol. III of the Report of the U. S. Geological Survey of the Terrs., p. , and are represented in Figs. 1–5. Plate XXIII*e* of the same. Better specimens of the *C. comma* show that the canine (or ? incisor) teeth are of very different character from those of this animal.

coming less as they ascend or descend to the latter. This sculpture is unparalleled in the class Mammalia, the nearest resemblance being found in the genus Ichthyosaurus among reptiles. A weak development of this sculpture is seen in the *Ectoconus ditrigonus* on the one hand, and the *Haploconus lineatus* on the other (Figs. 1–2 and 10).

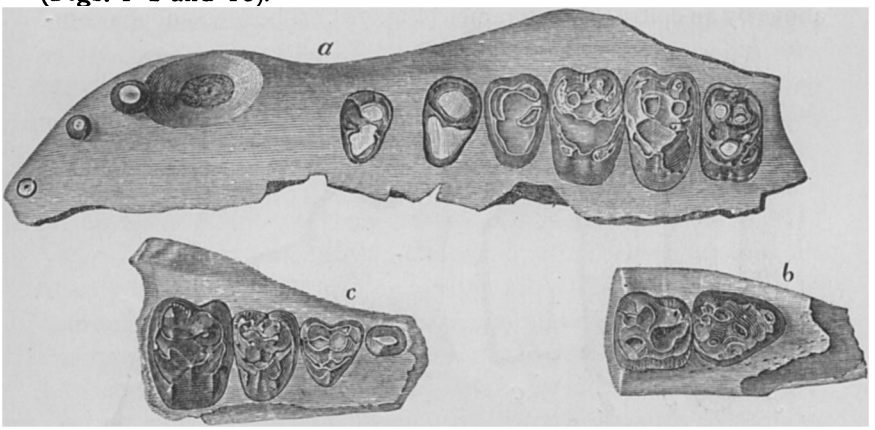

FIG. 4.—*Ectoconus ditrigonus* Cope, two-thirds nat. size; Fig. *a*, maxillary and premaxillary bones from below, retaining a good deal of the matrix. Fig. *b*, last two inferior molars worn by use. Fig. *c*, three deciduous, with first permanent molar, of a young animal. Original.

A fragmentary skull shows a postglenoid crest, and the robust posttympanic and paroccipital processes united, and leaving the meatus auditorius externus widely open below. The os petrosum is small and not inflated. The foramen ovale is not sepa-

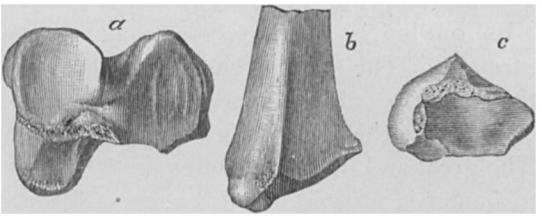

FIG. 5.—Parts of tibia of *Ectoconus ditrigonus*; *a*, head; *b*, distal portion; *c*, astragalar facet. From individual partially represented in Fig. 3. Original; two-thirds natural size.

rated from the meatus auditorius below. There are a postglenoid foramen and a supraglenoid foramen. There is also a well-marked mastoid foramen. The mastoid bone is extensively exposed. The cranial walls are thick, and there is a strong sagittal crest. The cervical vertebræ are much shorter than in Phenacodus, being deeper than long, and wider than deep (Fig. 6). They are

very slightly opisthocœlous. The caudal vertebræ are quite robust, indicating a powerful tail. Dorsals not found.

The tuberosities of the humerus are small in proportion to the size of the head. The condyle is much like that of a creodont, with internal flange and external cylinder, without intertrochlear crest or ridge. The internal epicondyle is large, and is pierced above by an epitrochlear foramen (Fig. 7*a*). The olecranon is com-

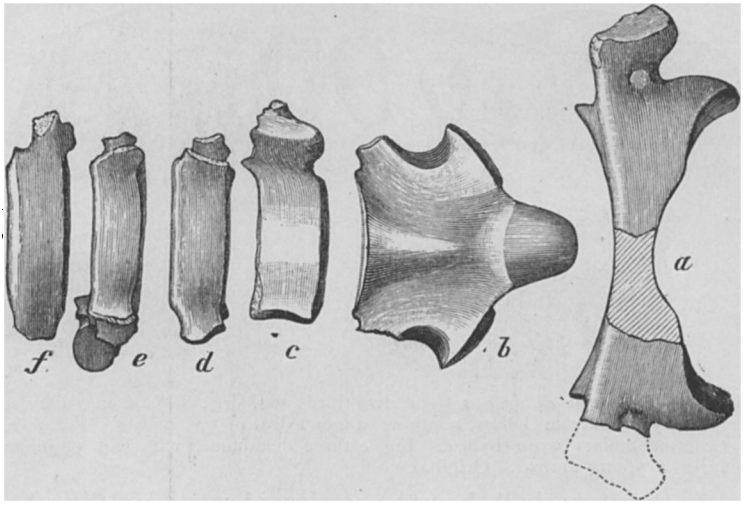

FIG. 6.—*Periptychus rhabdodon* Cope, cervical vertebræ of individual represented in figs 7 and 8, except figs. *c d e* and *f*, which belong to another individual; nat. size. Fig. *a*, atlas; *b*, axis; *c d e f*, third to sixth cervicals; all from below. Original, from Vol. III, Report U. S. Geol. Survey Terrs.

pressed. The head of the radius has a flat articulation with the ulna. Its outline is a transverse oval, narrowed at the external extremity. The scapula has a well developed coracoid hook and the spine rises abruptly from the neck (Fig. 7*h*).

In the *P. rhabdodon* the femur is not materially larger than the humerus. The great and little trochanter are well developed, and the third trochanter is situated low down, as in Phenacodus, and not opposite the little trochanter as in Creodonta (Fig. 8 *a*).

Portions of two posterior feet preserved display five metatarsals and several phalanges. The distal carina of the former is posterior and weak. The latter are rather narrow for an ungulate, but are not elongate, and are rather depressed; the distal ones are more robust, and are rather more narrowed distally than usual in Ungulata, and the neck of a broken phalange of an external digit is nearly round in section. The third digit is longest, and the

first, shortest; it is not very short, and is quite slender. Sesamoid bones are probably present. The posterior foot is that of a plantigrade animal (Fig. 8). The astragalus is much like that of the Proboscidea in form (Fig. 8 *b*). The head is moderately long and is depressed. Its distal extremity is regularly convex from side to side. The trochlea is horizontal, and is not grooved medially, but is very slightly concave. Fibular face vertical; malleo-

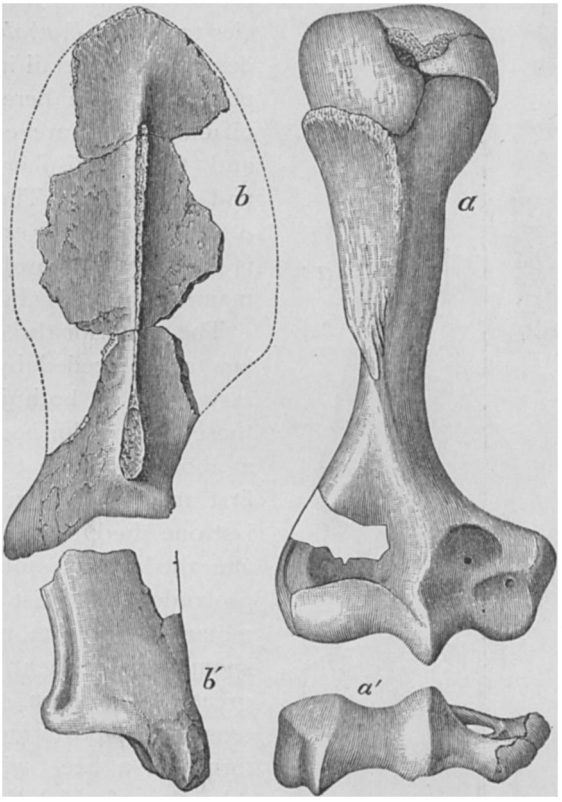

FIG. 7.—*Periptychus rhabdodon* Cope, bones of individual represented in figs. 6 and 8, except fig. *b'*, two-thirds nat. size. Fig. *a*, right humerus, with epiphysis not united, anterior view; *a'*, do., distal view. Fig. *b*, left scapula, external side; *b'*, internal side of proximal end of another left scapula. From the Puerco beds of New Mexico. Original, from Report U. S. Geol. Survey of Terrs., Vol. III.

lar face slightly oblique, and occupied by a deep central fossa. The head is not as convex as in Phenacodus, but is more recurved on both sides. On the external side it is so far recurved as to be continuous (in *P. rhabdodon*) with the sustentacular facet, and a part of this face is probably in contact with the cuboid, as in

many Creodonta, but which cannot be said therefore to overlap the astragalus, as in the Amblypoda.

I have obtained a cast of the top and sides of the cerebral cavity, and the proximal portion of the olfactory chambers, from a skull of a Periptychus in which the teeth are preserved, and prove the species to be the *P. rhabdodon.* I describe it in detail in another place, but state here that the olfactory lobes are enormous, and the hemispheres small and very flat. The *mesencephalon is entirely exposed.* It is probably the lowest known mammalian brain (Fig. 9).

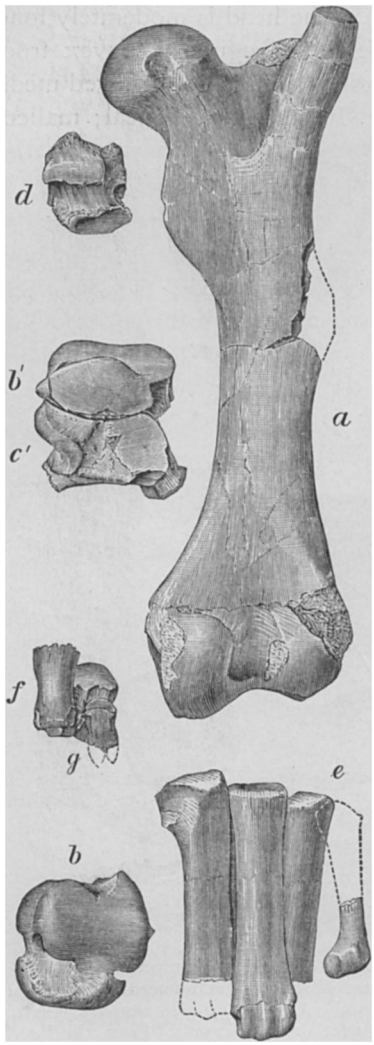

FIG. 8.—*Periptychus rhabdodon* Cope, bones, two-thirds nat. size. Fig. *a*, right femur, posterior view. Fig. *b*, left astragalus, from above; *b'*, do., distal end; *c'*, calcaneum, distal end; *d*, cuboid, from below; *e*, metatarsals, lacking M. I., from below; *f*, penultimate phalange; *g*, ungual phalange, from below. Original.

The posterior three premolars are preceded by temporary teeth in both jaws. Of these the anterior is protruded at about the same time as the first true molars, and is the last one shed, remaining until after the last true molar is fully protruded. The last milk premolar differs from the corresponding permanent one in its greater elongation. The extension is posterior, in the form of a heel with three tubercles, of which the median is very small, the crown resembling a permanent true molar, except that the anterior portion is a little more elongate and compressed. The anterior basal lobe is a mere elevation of the cingulum, as in the permanent premolar, but the internal cusp is more distinct than in the latter. The

penultimate milk premolar is more like the corresponding permanent tooth, but is a little more flattened and elongate, and the heel is not tubercular. The first milk molar is a little more compressed than the corresponding permanent tooth, and the edge of the heel is not tubercular. Otherwise they are similar.

I have dwelt on the characters of this genus more fully than on those of some of the others, as it constitutes a type of striking importance in the Early Eocene fauna. Its discovery I consider to be an important event in the history of palæontological science.

But three species of the genus are known thus far, the *P. coarctatus* (Fig. 10), *P. carinidens* and *P. rhabdodon* Cope. The first two have the jaws and teeth about the size of those of the collared peccary, while those of the last named are frequently larger than those of the white-lipped peccary. In all three species the premolars are larger than the true molars. The *Periptychus rhabdodon* must have had a peculiar appearance, and one unlike that of any known mammal. The long legs with plantigrade feet must have given it the form of a bear, but its very short neck is only paralleled by that of the elephant. While the shorter legs forbid near resemblance to that animal, and the shape of the head is very different, yet the resemblances in the figure cannot be overlooked. It had a long tail, stout at the base. It was a smaller animal than the *Phenacodus primævus*, but the head was of nearly the same size. The dental system does not furnish any weapons of offence or defence, and none are known from any other part of the skeleton. Its large premolar teeth are compressed at the apex and are capable of inflicting a severe bite. They are well adapted for cutting flesh or even of crushing bones or other hard substances. Its food may be supposed to have included substances of this character, derived perhaps from both animal and vegetable sources. The *Periptychus rhabdodon* was the most

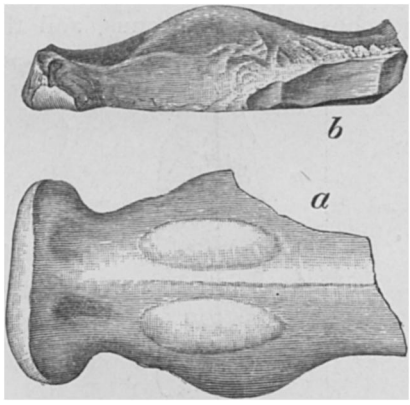

FIG. 9. Cast of superior wall of brain-case of *Periptychus rhabdodon*, nat. size. Fig. *a*, from above; *b*, left side. Original.

abundant species of the Puerco fauna, and must have had an important place in its economy.

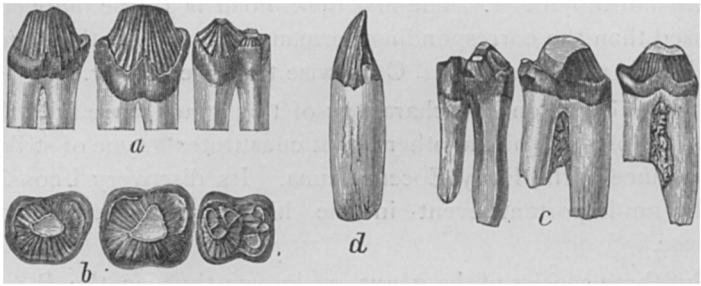

FIG. 10.—*Periptychus coarctatus* Cope, mandibular teeth, nat. size. Fig. *a*, last two premolars and first true molar, external view; *b*, do., from above; *c*, do., inner side; *d*, canine tooth. From Puerco beds, New Mexico. Original, from Report U. S. Geol. Survey Terrs., F. V. Hayden in charge.

With the genus Hemithlæus we enter a series of forms with simpler molar teeth and of smaller size. The intermediate tubercles of the superior molars are wanting in this genus and in Anisonchus and Haploconus, and the inferior premolars are abso-

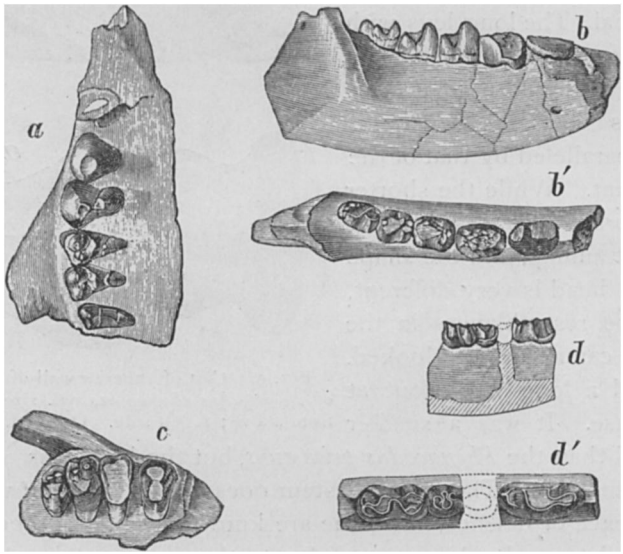

FIG. 11.—Jaws of Periptychidæ, nat. size, except fig. *d′*. Fig. *a*, *Haploconus entoconus* Cope, maxillary teeth from below. Fig. *b*, right mandibular ramus, right side, from same skull; *b′*, do. from above. Fig. *c*, *Hemithlæus kowalevskianus*, part of right maxillary bone from below. Fig. *d*, *Zetodon gracilis* Cope, part of mandibular ramus from side. Fig. *d′*, do., twice nat size, from above. Original, from Report U. S. Geol. Surv. Terrs., Vol. III.

lutely simple in all three. Hemithlæus is otherwise in its superior true molars a diminutive of Periptychus. The internal cusp-

like angle is flanked in front and behind by a cingular ridge, which is homologous with each accessory internal cusp of Periptychus. There are two species of the genus. The type, *H. kowalevskianus*, is about the size of the Virginian opossum, and is abundant. Its premolars are robust and conical (Fig. 11 *c*).

In Anisonchus the posterior cingulum of the superior true molars supports an accessory cusp, and there is no anterior cingulum or cusp. The normal internal cusp is, as in the two allied genera, the apex of a V, whose branches terminate close to the two external cusps. The superior premolars three and four, have internal cusps whose different forms distinguish two sections of the genus. In the type, *A. sectorius* Cope (Fig. 12 *a b*), the form is, as in the known species of Periptychus and Ectoconus, that of an elevated concentric cingulum; while in the *A. coniferus*, (Fig. 12 *c*) and *A. gillianus*, it is conical. The *A. coniferus* is the largest species, probably equaling the wolverine in size, while the *A. gillianus* Cope, is not larger than the *Bassaris astuta*. The *A. sectorius* is an abundant species of the Puerco fauna. Its teeth are smaller than those of a placental mammal of corresponding size, and the cranium is produced posteriorly, and is narrowed posterior to the orbits. It has a well-marked sagittal crest. Its length is about that of the skull of the red fox. Two other supposed species of Anisonchus were not larger than squirrels.

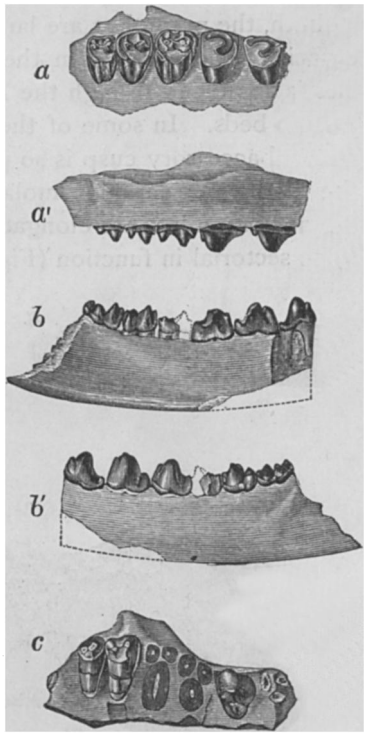

FIG. 12.—Jaws of Periptychidæ, nat. size. Fig. *a*, *Anisonchus sectorius* Cope, part of right maxillary bone with true molars and two premolars; *a'*, same, external view. Fig. *b*, right ramus mandibuli of another individual of the same species, external side; *b'*, internal side. Fig. *c*, *Anisonchus coniferus* Cope, right maxillary bone from below. Original, from the Puerco beds of New Mexico.[1] From Report U. S. Geol. Survey Terrs., Vol. III.

[1] This figure is made by combining portions of opposite sides of the same skull. In the original (Report U. S. Geol. Surv. Terrs., III, Pl. XXIV *g*, Fig. 6) the artist duplicated one of the tooth bases, an error which is now corrected.

There are four species of the genus Haploconus. They all differ from the species of Anisonchus in the entire simplicity of all the superior premolars, excepting the fourth. The internal cusp of the latter tooth presents the same variations as that of the species of Anisonchus. In the type, *H. lineatus*, the cusp is an elevated cingulum, and in *H. entoconus* (Fig. 11 *a b*) it is conical. The latter is the largest species of the genus; the former comes next in size, and is the most abundant. In both, the premolars are larger than the true molars, a character especially conspicuous in the *H. lineatus* (Fig. 13 *a*). This species is abundant, though the *H. entoconus* is not rare in the lower Puerco beds. In some of the species of this genus the posterior internal accessory cusp is so produced as to become the apex of the triangular superior molar. In the *H. xiphodon* Cope, the inferior premolars are elongate and much compressed, so as to be quite sectorial in function (Fig. 13 *c*).

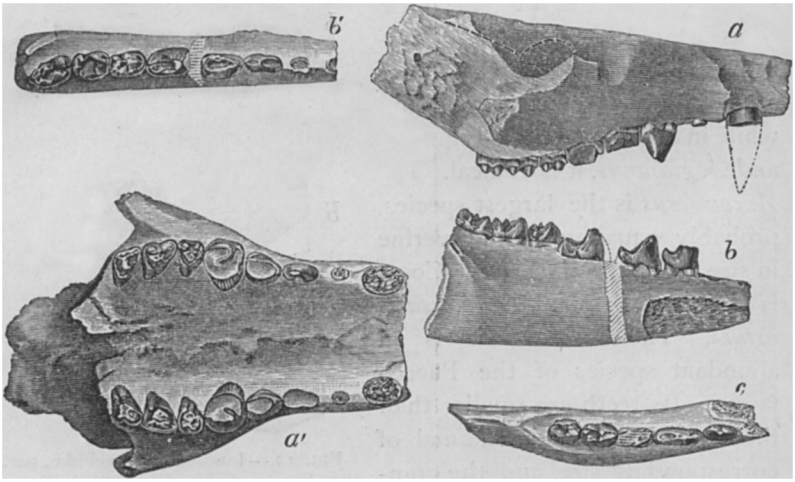

FIG. 13.—Species of Haploconus, natural size, from the Puerco beds of New Mexico. Fig. *a*, *Haploconus lineatus*, anterior part of cranium, right side; *a'*, do., from below. Fig. *b*, left mandibular ramus of same species, different individual, inner side; *b'*, do. from above. Fig. *c*, *Haploconus xiphodon*, part of right ramus mandibuli, from above. Original, from Report U. S. Geol. Survey Terrs., F. V. Hayden in charge, Vol. III.

In the genus Zetodon we have a distinct form of inferior molar. Each crown is theoretically composed of four crescents in pairs, in each of which the concave faces are presented *towards each other*, an arrangement unknown in any other genus of mammals.

In the fourth premolar there are two opposite crescents in front, like those of the true molars, but the posterior part of the crown is not double. The only species, *Z. gracilis* Cope, is a small animal with jaws not larger than those of a hedge-hog (*Erinaceus europæus*, Fig. 11 *d*).[1]

All the specimens of the Periptychidæ now known, were discovered by my assistant, Mr. David Baldwin, in New Mexico. Not only these, but the eighty species of Vertebrata now known from the Puerco epoch, are the results of the untiring, and sometimes dangerous explorations of this gentleman. Few palæontological collectors can show such a record.

(To be continued.)

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EDITORS' TABLE.

EDITORS A. S. PACKARD, JR., AND E. D. COPE.

—— In one of its late issues, our esteemed cotemporary, *Science*, advocated editorially the creation of an International Scientific Association, which should have its congresses, at intervals to be determined on, in the different countries of the civilized world.

Various objections may be urged against the organization of new scientific bodies, most of which are derivable from a consideration of the imperfections of those which exist. Should such an association be composed solely of persons distinguished for actual work done in pure science? or should experts in applied science be admitted to membership? or thirdly, should any person interested in science be eligible for membership? On the determination of its founders in respect to these fundamental points, the usefulness of such a body would depend. On its probable usefulness would depend the advocacy of many of the friends of science.

The utility of the meetings of scientific workers when properly managed, is generally conceded. The occasional emergence of the student from his studio to mingle with others engaged in kindred pursuits, has a stimulating and encouraging effect. It

[1] *Corrèction.*—In the article on the Tertiary Marsupialia in the last (July) number of the NATURALIST, I remark (p. 687): "The extinct marsupials belong to three types as distinguished by their superior molar teeth. These are trituberculate, quadrituberculate or multituberculate." As some of the extinct marsupials are Macropodidæ, the above language should be changed so as to read, trituberculate, quadritubercúlate, multituberculate, *or derivative forms.*